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Environmental Site Assessment
Sunnyvale East and West Channels
Sunnyvale, California

Environmental Site Assessment

Sunnyvale East and West Channels
Sunnyvale, California

This report has been prepared for:

Santa Clara Valley Water District

5750 Almaden Expressway, San Jose, California 95118-3614

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FOR Stason I. Foster, P.E.
Senior Project Engineer

Leonardo Alvarez, P.G., C.E.G.
Senior Principal Geologist
Quality Assurance Reviewer

REGISTERED GEOLOGIST
L. ALVAREZ
No.595
Certified Engineering
GEOLOGIST
EXP. 4/30/~~04~~ 08
STATE OF CALIFORNIA

405 Clyde Avenue, Mountain View, California 94043-2209
Main: 650.967.2365 Fax: 650.967.2785
website: www.trcsolutions.com

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ENVIRONMENTAL SITE ASSESSMENT
SUNNYVALE EAST AND WEST CHANNELS
SUNNYVALE, CALIFORNIA

1.0 EXECUTIVE SUMMARY

This Environmental Site Assessment was performed for the Santa Clara Valley Water District (SCVWD), to evaluate potential environmental issues that may affect the planning for flood control improvements along the Sunnyvale East and West Flood Control Channels located in Sunnyvale, California. We understand that the District is the sole owner or lessee of the property along the channel alignments or has an easement along the channels; thus, no real estate acquisitions are being contemplated at this time.

The results of this study will be used in the development of a problem definition report for the planned project, to assist in the development of cost estimates and schedules, and to aid in establishing provisions for safe working conditions for District staff and contractors.

Prior to construction of the channels during the late 1950s and 1960s, the land along the channel alignments was primarily agricultural (row crops and orchards). Currently, most properties adjacent to the West Channel are developed for commercial use. A mix of residential and commercial properties currently borders the East Channel. Commercial businesses that are common in the site area that may pose potential environmental concerns include research and development facilities, electronic component manufacturing firms and similar businesses that use and/or store hazardous materials; several such businesses were identified as reported spill incidents (see Section 5.1).

Studies of nearby channels including the Northern Channel, the Moffett Channel and channels associated with Pond A4, detected contaminants including pesticides, polychlorinated biphenyls (PCBs), metals and polynuclear aromatic hydrocarbons (PAHs) in levee soil and channel sediment (see Section 5.2). Because these channels are nearby or adjacent to the Sunnyvale Channels and are similar in construction and use (primarily used for storm water drainage), it appears reasonable to conclude that similar contaminants, at similar concentrations, may also be present in levee soil and sediment within the Sunnyvale channels.

The detected contaminants most likely are from non-point sources associated with urban runoff, as well as past agricultural activities. Additionally, the Sunnyvale wastewater treatment plant (WWTP) effluent is discharged into the northern portion of the Sunnyvale West Channel; this discharge also is a possible contaminant source (see Section 5.2.2). Some of the contaminants, such as pesticides, may be present along the entire length of the channels since the land along the channel alignments historically was primarily agricultural. The other potential contaminants including PCBs, metals, and PAHs, if present, would be expected to be at their highest concentrations near and down-stream of commercially developed areas that are more common within the northern portion of the study area.

Several spill incidents that have impacted ground water, mainly with volatile organic compounds (VOCs), were identified near the channel alignments (see Section 5.0). Based on the information reviewed, it appears likely that ground water below most of the Sunnyvale West Channel is impacted with VOCs. VOCs additionally have been reported in ground water near portions of the East Channel (see Section 5.0).

We understand that future improvements for flood control purposes may include excavation, raising existing levees, building new levees or floodwalls, bridge and culvert replacement, and erosion protection measures. At some locations, this work will presumably require disturbing levee soil and/or channel sediment; contact with impacted ground water or the need for dewatering could also occur. Because soil, sediment and/or ground water could contain contaminants, testing of these materials at proposed work locations should be performed to better evaluate the extent of impact, if any, and to help establish appropriate methods for worker safety and material handling/disposal. The scope of such testing would be dependent upon the type and location of work to be performed.

Although existing sampling data from the Sunnyvale channels is limited, the data reviewed from studies of the nearby Northern Channel and Pond A4 (as discussed in Section 5.2) suggests that contaminant concentrations are likely to be relatively low when compared to hazardous waste criteria or human health screening levels. The reported concentrations, however, have commonly exceeded screening levels and/or established site-specific clean up goals developed for the protection of ecological receptors.

Thus, we would not expect construction worker health and safety issues to be a significant obstacle associated with the project. As noted above, on-site testing should be conducted, which will provide a greater degree of certainty. An appropriate health and safety plan should subsequently be developed and implemented.

Based on the available data, it appears likely that excavated soil or sediment could be disposed off-site as non-hazardous waste. If on-site reuse of these materials is contemplated, further evaluation of potential impacts to ecological receptors would be warranted.

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ENVIRONMENTAL SITE ASSESSMENT
SUNNYVALE EAST AND WEST CHANNELS
SUNNYVALE, CALIFORNIA

2.0 INTRODUCTION

2.1 Purpose

This Environmental Site Assessment was performed for the Santa Clara Valley Water District (SCVWD), to evaluate potential environmental issues that may affect the planning for flood control improvements along the Sunnyvale East and West Flood Control Channels located in Sunnyvale, California (Figure 1). These future improvements may include excavation, raising existing levees, building new levees or floodwalls, bridge and culvert replacement, and erosion protection measures. The District is the sole owner or lessee of the property along the channel alignments or has an easement along the channels; thus, no real estate acquisitions are being contemplated at this time.

The results of this study will be used in the development of a problem definition report for the planned project, to assist in the development of cost estimates and schedules, and to aid in establishing provisions for safe working conditions for District staff and contractors.

2.2 Site Location and Background

2.2.1 History of the Channels

The Sunnyvale East and West Flood Control Channels were constructed by the SCVWD between 1959 and 1967, to provide drainage for a large area of Sunnyvale between Stevens Creek and Calabazas Creek, where natural channels did not historically exist (Santa Clara Valley Urban Runoff Pollution Prevention Program [SCVURPPP], 2005).

In the early days of Sunnyvale, rainfall and resulting storm water would naturally drain to either Stevens Creek or Calabazas Creek. With the ground surface subsidence in the northern portion of the City that occurred due to artesian wells and ground water pumping for agriculture between 1900 and 1950, the natural surface drainage pattern was disrupted.

In December 1955, a significant flood that inundated the northern portions of Sunnyvale occurred in the areas between Calabazas Creek and Stevens Creek. This was partly due to the eight to ten feet surface subsidence of land in the northern part of the City, where the creek mouths for Calabazas and Stevens Creek were below the normal Bay tide level. There was also a lack of adequate drainage outlets to the Bay in the central portion of Sunnyvale as the dikes of the salt ponds (owned by the Leslie Salt Company at that time) held the runoff behind them until low tides let the water drain into the Bay.

In about 1955, the Santa Clara County Flood Control and Water Conservation District (now the SCVWD) decided that two artificial channels should be constructed to provide drainage for a significant portion of Sunnyvale between Calabazas Creek and Stevens Creek to help prevent flooding. These are now the Sunnyvale West and Sunnyvale East Channels, which empty into the Moffett Channel and Guadalupe Slough, respectively. Note that for the purposes of this environmental site assessment, the Moffett Channel is considered part of the Sunnyvale West Channel.

2.2.2 Channel Construction

The Sunnyvale West Channel is constructed mainly of compacted earthen fill. Reinforced concrete box culverts occur at each road crossing, and between the Mathilda Avenue Crossing and the Highway 101 crossing. The channel is approximately 3 miles in length and extends from the confluence of the Guadalupe Slough to near Almanor Avenue. The section between the Guadalupe Slough and the City of Sunnyvale Waste Water Treatment Plant (WWTP) also is known as the Moffett Channel (see Figure 3). Construction for the Sunnyvale West Channel was initiated by the SCVWD in 1959 (SCVURPPP, 2005).

The Sunnyvale East Channel was similarly constructed and extends in an almost straight line from the northernmost border of the City on the Guadalupe Slough to its southern border with the City of Cupertino near Highway 280. It is approximately 6 miles in length and also constructed with alternating stretches of compacted earthen levees and reinforced box culverts at road crossings. There is an underground portion (box culvert) located to the south of the El Camino Real (Highway 82) crossing, and the southernmost section ending at Highway 280 is enclosed in a 72" concrete pipe (SCVURPPP, 2005). Construction of the Sunnyvale East Channel from the Guadalupe Slough to Highway 101 began in 1964. The Channel was extended from Highway 101 to Highway 280 by 1967.

The channels drain an area of approximately 14.8 square miles that is predominantly urban. The channels flow from south to north, draining portions of Sunnyvale, Mountain View, Cupertino and unincorporated Santa Clara County.

2.3 Scope of Work

As requested, the following scope of work was performed to evaluate potential environmental issues related to current and historic use of hazardous material on-site or at nearby facilities that could significantly impact soil and/or ground water quality along the channel alignments. This scope was outlined in our agreement dated March 6, 2007.

- A reconnaissance of the site to assess readily observable indications of current or historic activities that have or could significantly impact the site.
- A walk-through of the project area and a brief drive-by survey of the adjacent properties to note the current land use and, if possible, note facilities that appear likely to use, handle, or store significant quantities of hazardous materials.
- Review readily available topographic maps and historic aerial photographs to help establish past site and immediate vicinity usage.
- Review a regulatory agency database report to evaluate the potential impact to the site from reported contamination incidents at nearby facilities within tangential one-mile radius from the center line of the channels.
- Review of regulatory agency files for selected sites identified as being of potential concern to obtain information about the use and storage of hazardous materials and/or the status of reported spill incidents.
- Interviews with knowledgeable persons to evaluate the environmental setting of the site.
- Data evaluation, assessment of potential hazardous, development of recommendations, and report preparation.

Our scope of services did not include sampling or analysis of on-site air, soil, or ground water. The limitations of this environmental site assessment are presented in Section 7.

3.0 SITE RECONNAISSANCE

3.1 Site Visit

Our representative (Stason I. Foster, P.E.) visited the site on April 4, 2007. The channels were viewed for readily observable indications of potential environmental concern. Particular attention was made to storm drain outfalls and debris in the channels.

Channel segments between various road crossings were secured with locked cyclone fencing. A gravel-covered access/maintenance road was typically present on one, or both, sides of each channel segment. The site reconnaissance was performed by traveling along the levees of each channel on foot or with the aid of a bicycle. Some shorter segments of the Eastern Channel with frequent road crossings were observed by viewing from the access gates at each end of the segment.

At the time of our site visit, the channels had generally low water flow, especially at the southern (up-stream) ends; an increase in water flow was observed in the more northerly portions of each channel.

No hazardous materials were observed along the channel alignments (*i.e.*, within the SCVWD rights-of-way). Storm drain outflows did not have obvious staining associated with them. Minimal amounts of debris were observed within the channels and included mainly paper and plastic trash.

A ground water treatment system that appeared to be within the SCVWD right-of-way along the East Channel, was observed on the south side of the East Kifer Road crossing (see Figure 2B). The treatment system was constructed on a bermed concrete pad and was enclosed within chain-link fencing. It appeared to discharge treated water into the channel at the box culvert that extends beneath East Kifer Road (see Section 5.2.8 for additional details).

The Sunnyvale WWTP outfall was observed to discharge into the West Channel (see Section 5.2.2). The eastern terminus of the Northern Channel and the eastern terminus of the Lockheed Channel were observed nearby (see Figure 3). These channels transport storm water from nearby Moffett Field and Lockheed facilities located to the west and are further discussed in Section 5.2.1. A culvert was observed that connects the Northern Channel to the Lockheed Channel. A nearby pump station and associated piping were observed that appear to transfer water from the eastern terminus of the Lockheed Channel into the Sunnyvale West Channel; the pump station was not active.

3.2 Site Vicinity Reconnaissance

To evaluate nearby land use, adjacent properties were observed from public rights-of-way and/or from locations along each channel during our site visit. Most of the areas bordering the channel alignments were observed to be developed with residences, schools, parks or commercial buildings. An overview of observed land use in the vicinity of each channel is presented below and on Figures 2 and 3.

3.2.1 Site Vicinity - East Channel

Properties adjacent to the southern portion of the East Channel, from Highway 280 to about East Evelyn Avenue, were observed to be predominantly residential, except for businesses near the El Camino Real crossing that consisted of two auto dealerships, a hotel and a restaurant.

Several commercial businesses that appeared to potentially use hazardous materials were observed between East Evelyn Avenue and East Duane Avenue, as well as between Highway 237 and East Caribbean Drive. What appeared to be a former manufacturing facility (now vacant), was observed just north of the Highway 101 crossing. Two PG&E substations also were observed adjacent to the channel; one near East Evelyn Avenue and the second near Highway 101. The City of Sunnyvale Landfill was observed adjacent to the channel to the north of East Caribbean Drive (see Figure 2A). Based on our visual observations, no specific impacts to the channel alignment associated with these adjacent commercial facilities were readily apparent.

3.2.2 Site Vicinity - West Channel

Properties adjacent to the West Channel were observed to be predominantly commercial. As is common to most commercial areas, several facilities appeared likely to use hazardous materials; however, no evidence of significant spills was readily observable. The City of Sunnyvale Landfill was observed adjacent to the channel to the north of East Caribbean Drive. The Sunnyvale WWTP and associated outfall, which discharges to the channel, also were observed. Based on our visual observations, no specific impacts to the channel alignment associated with these adjacent commercial facilities were readily apparent.

3.3 Interviews

During our study, we contacted Mr. Ray Bramer, Field Maintenance Planner with the SCVWD. Mr. Bramer indicated that he is involved with maintenance activities along the East and West Channels and that he has been with the District for the past 16 years.

Mr. Bramer stated that typical maintenance activities include removal of sediment (mainly form the tidally influenced, northern portions of the channels), erosion repair work, and removal of unwanted vegetation from the channels and levees. He indicated that sediment removal is typically performed every three to five years; a schedule for other tasks was not specified but they presumably are performed on an as needed basis. He was not aware of any significant chemical spills to the channels or other activities of concern, such as illegal dumping of hazardous materials.

4.0 HISTORICAL REVIEW

4.1 Photograph and Map Review

To evaluate the site history and prior land uses, the following were reviewed:

▼ Aerial photographs dated 1939, 1956, 1965, 1974, 1982, 1993 and 1998 obtained from Environmental Data Resources of Milford, Connecticut (EDR).

▼ Available USGS 7.5-minute topographic maps dated 1899, 1902, 1943, 1947, 1948, 1953, 1961, 1968, 1973, 1980, 1991 and 1997 obtained from EDR. These maps depict various portions of the channel alignments.

Table 1 summarizes observations made from the aerial photographs and topographic maps. Copies of the aerial photographs and topographic maps are attached in Appendix A.

Table 1.
Historical Aerial and Topographical Summary of the Channel Alignments and Adjacent Properties

Date	Source	Comments
1899 and 1902	Topographic Maps	East and West Channels: On the 1899 and 1902 topographic maps, the channels do not appear to have been constructed. The general vicinity of the channel alignments is depicted mainly as undeveloped land with widely spaced residences. Guadalupe Slough and marsh land are depicted at the southern fringe of San Francisco Bay.
1939 and 1956	Aerial Photographs and Topographic Maps	East Channel: On the 1939 and 1956 aerial photographs, the East Channel does not appear to have been constructed. In 1939, properties along the channel alignment are shown to consist mainly of agricultural land including row crops and orchards. By 1959, some of the adjacent properties appear to have been developed mainly for residential use; however, agricultural use is still predominant. The topographic maps dated during this time period depict conditions similar to those shown on the aerial photographs. West Channel: On the 1939 and 1956 aerial photographs, the West Channel does not appear to have been constructed, except for the northernmost segment (north of the current Sunnyvale WWTP), which also is known as the Moffett Channel. In 1939, properties along the channel alignment are shown to consist mainly of agricultural land (row crops). By 1959, a portion of the adjacent Sunnyvale WWTP and Sunnyvale landfill appears to have been constructed; agricultural use is still predominant along the remainder of the alignment. The topographic maps dated during this time period depict conditions similar to those shown on the aerial photographs.

(continued)

Table 1.
Historical Aerial and Topographical Summary of the Channel Alignments and Adjacent Properties

Date	Source	Comments
1961 through 1973	Aerial Photographs and Topographic Maps	East Channel: On the 1965 aerial photograph, the East Channel appears to have been constructed, except for some segments of the channel between Highway 101 and 280. A mix of agricultural properties and residential developments, along with a smaller number of commercial buildings, is shown to border most of the alignment. The adjacent Sunnyvale landfill appears to be present at the northern portion of the channel. The channel is not well depicted on the topographic maps from 1961, 1968 and 1973; however, the general alignment is obvious and the uses of adjacent properties are depicted to be similar to those shown on the aerial photographs. West Channel: On the 1965 aerial photograph, the West Channel appears to have been constructed. Agricultural properties are shown to border most of the alignment. Commercial structures associated with the Lockheed Martin facility are adjacent to the southern portion of the alignment. As with the prior photograph, the adjacent Sunnyvale WWTP and Sunnyvale landfill also are shown. The topographic maps from 1961, 1968 and 1973 show the channel and depict conditions similar to those shown on the aerial photographs.
1974 through 1998	Aerial Photographs and Topographic Maps	East Channel: On the 1974 aerial photograph, an increase in commercial and residential development of properties adjacent to the East Channel is apparent. The subsequent photographs show further increases in development and corresponding decreases in undeveloped/agricultural land. The topographic maps dated from the 1980s and 1990s show the channel to be located within an urban developed area. West Channel: On the 1974 aerial photograph, an increase in commercial development of properties adjacent to the West Channel is apparent. The subsequent photographs show further increases in commercial development and corresponding decreases in undeveloped/agricultural land. The topographic maps dated from 1991 and 1997 show the channel to be located within an urban developed area.

5.0 REGULATORY RECORDS

5.1 Regulatory Agency Database Report

During this study, regulatory agency database reports were obtained from EDR and reviewed to help establish whether contamination incidents have been reported within a one-mile radius from the center line of each channel. The database reports are attached in Appendix B and include a list of the database sources reviewed, a detailed description of the sources, and a radius map indicating the locations of the reported facilities relative to the channel alignments.

Note that a large number of spill incidents were reported in the vicinity of the channel alignments. Due to the scope, time and budgetary constraints outlined in our agreement, detailed reviews of each incident were not performed. Alternatively, an attempt was made to identify those incidents considered to be most likely to impact soil or ground water quality within the channel alignments. The potential for site impact was evaluated based on information in the database records regarding the type of release, current case status, and distance and direction from the site. Additionally, for many of the listed spill incidents, a cursory review was made of selected environmental reports available from the following sources to obtain further information regarding the extent of the reported spill and status of cleanup efforts.

- Santa Clara County Department of Environmental Health Local Oversight Program (http://lustop.sccgov.org)
- SCVWD Groundwater Management Unit, Solvents and Toxics Liaison Program (http://www.valleywater.org)
- The State of California GeoTracker Database (http://geotracker.swrcb.ca.gov)

Nearby reported hazardous materials spills and releases considered to have the greatest potential to impact the site are presented in Table 2; additional information for the listed facilities was reviewed and is discussed below in Section 5.2.

Table 2. Nearby Reported Hazardous Materials Spills and Releases

Facility and Address	Map ID[1]	Remarks	Potential Impact to Channels[2]
WEST CHANNEL FACILITIES			
Moffett Federal Air Field Moffett Field	NA[3]	National Priority List (NPL) site.	Yes
City of Sunnyvale Solid Waste Disposal & Recycling Center Caribbean Drive and 164 Carl Road.	2 and 3	Leaking underground storage tank (LUST) site and solid waste landfill.	Unlikely
City of Sunnyvale Water Pollution Control Plant	4	Waste water outfall from treatment plant was observed to discharge to the West Channel.	Yes
A.C. Ball Company 141 Caspian Court	10	LUST and Spills, Leaks, Investigation and Cleanup (SLIC) site. Adjacent to West Channel alignment. Reported as closed case.	Yes
Lockheed Martin 1111 Lockheed Way	23	Listed in LUST and several other databases.	Unlikely
645/675 Almanor, Et Al 645/675 Almanor Avenue	41	LUST and SLIC site.	Yes
Litton Applied Technology 525 Almanor Avenue	42	LUST and SLIC site.	Yes
Ventritix Intersil 610 North Pastoria Avenue	48	LUST and SLIC site.	Yes
Siemens Microelectronics, Inc. 639 North Pastoria Avenue	48	LUST and SLIC site.	Yes

(continued)

Table 2. Nearby Reported Hazardous Materials Spills and Releases

(continued)

Facility and Address	Map ID1	Remarks	Potential Impact to Channels2
EAST CHANNEL FACILITIES			
Advanced Micro Devices (AMD) 915 Deguigne Drive	25	LUST and SLIC site.	Yes
T-M Manufacturing 695 East Arques Avenue	26	LUST and SLIC site.	Yes
Philips Semiconductor 811 East Arques Avenue	31	LUST and SLIC site.	Yes
Signetics Corporation/ Philips Semiconductor 740 Kifer Road	36	LUST and SLIC site.	Yes

[1] See Appendix B

[2] Based on additional information discussed below in Section 5.2.

[3] Depicted as shaded area.

5.2 Regulatory Agency File Review

For the facilities listed above in Table 2, a more detailed review of selected environmental reports from the above sources (and reports provided by the SCVWD) was performed. A brief summary of each spill incident is presented below. Additionally, Sections 5.2.9 and 5.2.10 present a discussion of additional information reviewed during this study related to the Moffett Channel and Pond A4, respectively.

Key documents, such as maps showing the extent of impacted ground water and/or copies of selected environmental reports, are included in Appendix C.

5.2.1 Moffett Federal Air Field

Moffett Federal Air Field (Moffett Field) is a former Navy installation that was designated as a Superfund site in 1987 due to the presence of soil and ground water contamination at several locations. Several contaminated sites have been addressed and have received closure; at others, site characterization and cleanup work is ongoing. Most impacted areas at Moffett Field appear to be located ½ mile or more west of the Sunnyvale West channel and do not appear likely to impact on-site soil or ground water. One exception to this is Moffett Field Site 27, which also is known as the Northern Channel. The Northern Channel drains water from various locations at Moffett Field and flows easterly into the Lockheed Channel where it is pumped into the Moffett Channel (*i.e.*, into the northernmost portion of the Sunnyvale West Channel), which drains to the Guadalupe Slough and eventually into San Francisco Bay.

Identified contaminants of concern include metals, organochlorine pesticides and polychlorinated biphenyls (PCBs). These contaminants have been detected in levee soil and channel sediments at concentrations exceeding established site-specific cleanup goals (Department of the Navy, 2005). The sediment cleanup goals established for the Northern Channel are listed below:

- Total PCBs: 0.35 ppm
- Total DDT: 0.0648 ppm
- Total Chlordane: 0.931 ppm
- Cadmium: 184 ppm
- Lead: 173 ppm
- Mercury: 1.52 ppm
- Selenium: 0.926 ppm
- Silver: 13.7 ppm
- Zinc: 720 ppm

In the Northern Channel, total PCBs were detected in most sediment sampling locations at concentrations above the cleanup goal, with a maximum concentration of 23.8 ppm. DDT was detected in all sediment sampling locations, except for Transect 8, at concentrations above the cleanup goal, with a maximum concentration of 3.49 mg/kg. All six metals identified as chemicals of ecological concern (COEC) had concentrations above their respective cleanup goals in samples from at least one location, with silver and selenium being detected the most at concentrations above their cleanup goals (Department of the Navy, 2005).

Soil samples from levees along the Northern Channel also were analyzed. Contaminant concentrations in levee soil were compared to residential preliminary remediation goals (PRGs) (U.S. Environmental Protection Agency 2004). Concentrations of chemicals in soil exceeded the residential PRGs along the Northern Channel berms at two locations; lead was detected at up to 541 ppm and PCBs were detected at up to 7.3 ppm (Department of the Navy, 2005).

An evaluation of human health risks concluded that risks are within or less than the cancer risk management range of 10^{-6} to 10^{-4} and less than a hazard index of 1.0 for non-cancer risks that EPA generally considers acceptable. In addition, human health risks were found to be minimal when compared with the potential risks to ecological receptors; therefore, cleanup goals established to protect ecological receptors are expected to further reduce risks to recreational users (Department of the Navy, 2005).

Additional details regarding the site, including sampling locations and contaminant concentrations are presented in selected documents attached in Appendix C.

5.2.2 City of Sunnyvale Landfill and Waste Water Treatment Plant

The City of Sunnyvale Landfill/Recycling Center and adjacent Waste Water Treatment Plant (WWTP) are listed on several regulatory databases. As shown on Figures 2 and 3, the landfill is located adjacent to both channel alignments; the WWTP is located adjacent to the West Channel.

Based on our observations and topography, landfill debris appears to be contained in hills bordering the East and West channels; however, debris does not appear to have been placed within the channel alignments. Based on recent ground water sampling data (Ulrick & Associates, 2001), halogenated volatile organic compounds (VOCs) including trichloroethene (TCE) and dichloroethene (DCE) were detected in ground water at concentrations ranging from 5 to 11 parts per billion (ppb). These concentrations were reported to be consistent with those detected during prior sampling events. The DCE was reported to have been detected in up-gradient wells, suggesting that at least part of the ground water contaminants may be from off-site sources. Based on the reported low contaminant concentrations in ground water and since landfill debris does not appear to have been placed beneath the channels, the City of Sunnyvale Landfill does not appear to have significantly impacted soil or ground water quality within the channel alignments.

Additionally, the WWTP discharges treated effluent to the Moffett Channel (*i.e.*, the northern portion of the Sunnyvale West Channel). Based on our review of historic aerial photographs, the WWTP was constructed prior to 1939; thus, it has been in operation for many decades. Historically, the extent of treatment of sewage inflows to wastewater treatment plants was often limited and occasional discharges of untreated sewage were common. Over time, discharges have become more highly regulated and treatment technologies have improved. Although no documentation of specific contaminant discharges from the WWTP was reviewed during this study, the WWTP is considered to be a potential source of contaminants that may be persistent in the environment, such as metals, PCBs and PAHs. The effluent currently discharged by the WWTP is presumably of a higher quality than that discharged in prior decades; therefore, contaminants, if present, are most likely the result of historic effluent discharges or the slow accumulation of environmentally persistent contaminants in sediment over time.

5.2.3 A.C. Ball Company, 141 Caspian Court

This site is located directly adjacent to the West Channel. A release of VOCs from underground storage tanks (USTs) was documented to have impacted soil and ground water quality at this site. Prior investigations reportedly documented a plume of VOC impacted ground water extending approximately 2,000 feet from the site along the West Channel to a point near the Sunnyvale WWTP. A ground water and soil vapor extraction system subsequently was installed and operated until 1996.

A No Further Action letter was issued by the Regional Water Quality Control Board (RWQCB) in 2004. As of 2002, VOCs present in ground water included PCE (10 ppb), TCE (42 ppb), TCA (69 ppb), DCA (16 ppb), 1,1-DCE (190 ppb), 1,2-DCE (17 ppb) and 1,4-dioxane (22 ppb) (CRWQCB, 2004). The case closure letter and closure summary are attached in Appendix C. Although the case has been closed, residual VOC concentrations likely remain in ground water below the West Channel.

5.2.4 Lockheed Martin, 1111 Lockheed Way

The Lockheed Martin site is located to the west of the Sunnyvale West Channel. Since 1987, numerous investigations have been conducted to evaluate soil and ground water quality. These studies identified mainly VOCs in ground water below the site. A ground water extraction and treatment system subsequently was installed and is currently in operation. Based on the data reviewed (Cameron-Cole, 2005), the Lockheed facility does not appear to have impacted ground water below the channel alignments.

5.2.5 North Pastoria/Almanor Avenue Study Area (NP-AA Study Area)

The facilities listed above in Table 2 that are located on North Pastoria and Almanor Avenue are within a study area containing numerous sources of soil and ground water contamination. The southern portion of the Sunnyvale West Channel extends onto properties that are part of this study area. Ground water beneath the area is impacted with VOCs. Several site plans and a RWQCB cleanup order that provide additional site background information and depict areas of impacted ground water are attached in Appendix C. As shown, VOC impacted ground water extends beneath the southern portion of the Sunnyvale West Channel. TCE and DCE appear to be the primary contaminants and were detected in ground water near the West Channel at approximate concentrations up to 400 and 200 ppb, respectively.

5.2.6 Advanced Micro Devices (AMD), 915 DeGuigne Drive

Ground water near the Sunnyvale East Channel between Wolfe Road and Highway 101 is impacted by VOCs associated with several commingled plumes. This area is known as the off-site operable unit (OOU) and consists of the commingled plumes of the AMD site at 915 DeGuigne Drive and the Philips Semiconductor site at 811 East Arques Avenue, among others. Based on the data reviewed, the Sunnyvale East Channel is the approximate western border of the commingled ground water plume (Locus Technologies, 2006). It appears likely that low concentrations of VOCs may be present in ground water below the East Channel between Wolfe Road and Highway 101. TCE and DCE appear to be the primary contaminants; near the East Channel, the concentrations appear to be less than about 50 ppb.

5.2.7 T-M Manufacturing, 695 East Arques Avenue

The T-M Manufacturing site borders the Sunnyvale East Channel between East Arques Avenue and East Taylor Avenue. Several environmental investigations have been performed at the Site between 2003 and 2006 to evaluate potential soil and ground water contamination. These investigations have indicated that ground water beneath the majority of the site is impacted with TCE at concentrations up to 300 ppb (CRWQCB, 2006). TCE concentrations up to 94 ppb were detected in ground water near the East Channel (SECOR, 2006).

5.2.8 Signetics Corporation/Philips Semiconductor, 740 Kifer Road

This site is located adjacent to the Sunnyvale East Channel at the Kifer Road crossing. Ground water in the vicinity of the site has been impacted by VOCs (Locus Technologies, 2006). Of the chemicals detected at the site, TCE has been detected most frequently and at the highest concentrations. A ground water treatment system is present at the site, which is being operated (under RWQCB oversight) by Locus Technologies on behalf of Philips Semiconductor. As observed during our site visit, the treatment system appears to be located in a fenced enclosure within the SCVWD right-of-way along the channel alignment. During 2005, the average TCE concentration within the treatment system influent was reported to be 55 ppb; lower concentrations of TCA, DCE and PCE also were reported. Ground water beneath the East Channel in the vicinity of this facility appears to be impacted by VOCs from this incident.

5.2.9 Moffett Channel

Most of the data collected during prior environmental studies associated with the Moffett Field Site 27 (see Section 5.2.1) focused on evaluation of soil and sediment quality within the Northern Channel. However, 11 sediment samples also were collected from the Moffett Channel, which consists of the northern portion of the Sunnyvale East Channel. A discussion of this data was presented in a report by Tetra Tech EM, Inc. dated February 26, 2004 and titled *Technical Memorandum Investigation of the Moffett Channel, Former Naval Air Station, Moffett Field, Santa Clara County, California.* A copy of this memorandum is attached in Appendix C.

The Moffett Channel functions to convey water from the Sunnyvale West Channel, the Lockheed Channel, and the Northern Channel to Guadalupe Slough, which drains by gravity into South San Francisco Bay. The Moffett Channel also receives treated effluent from the Sunnyvale WWTP located at its southern end.

A comparison by Tetra Tech of the sampling data from the Moffett Channel to action levels established for the Northern Channel indicates that total DDT and PCB concentrations detected in sediment from the Moffett Channel exceed the cleanup goals established for the Northern Channel. Metals, however, were not detected above the cleanup goals. Total DDT and total PCBs were detected at up to 0.589 and 1.601 ppm, respectively. The sediment cleanup goals established for the Northern Channel are listed above in Section 5.2.1.

5.2.10 Pond A4

Pond A4 is located adjacent to the northern segments of both the Sunnyvale East and West Channels. This 310-acre pond has been operated by Cargill Salt Company as an evaporation pond since the 1930s (CH2MHILL, 2005). The SCVWD recently purchased the pond and plans to restore it to a tidal marsh system. To facilitate planning for the restoration project, CH2MHILL collected several samples from sediment within the pond and soil from surrounding levees. Additionally, several sediment samples were collected from channels immediately surrounding the pond, including the Moffett Channel, the Guadalupe Slough, and the northern portion of the Sunnyvale East Channel.

The analytical results were compared to hazardous waste criteria contained in Title 22 of the California Code of Regulations (total threshold limit concentrations [TTLCs]) as well as to the screening guidelines for wetland surface and foundation materials outlined in the *Beneficial Reuse of Dredge Material: Sediment Screening and Testing Guidelines (RWQCB, 2000).*

As reported by CH2MHILL, no analytes were detected at concentrations exceeding their respective TTLCs. Further testing for soluble chromium, however, was recommended. Additionally, PCBs, metals, pesticides and polynuclear aromatic hydrocarbons (PAHs) were reported at concentrations exceeding screening levels for wetland surface materials in one or more samples. Wetland foundation material screening levels also were exceeded in a few samples. The contaminants detected that exceeded the wetland screening levels and their maximum detected concentrations (in ppm) are as follows: total DDT (0.238), total PCBs (0.0297), cadmium (1.06), chromium (219), lead (75.3), mercury (0.62), nickel (169), selenium (4.62), silver (1.57), 1-methylphenanthrene (0.0371), benzo[g,h,i]perylene (0.417), benzo[k]fluoranthene (0.279), biphenyl(diphenyl) (0.0131), indeno[1,2,3-c,d]pyrene (0.467), 2,6-dimethylnapthalene (0.110), 2-methlynaphthalene (0.0718), and dibenz[a,h,]anthracene (0.038). The development of project-specific reuse levels was recommended.

6.0 FINDINGS AND CONCLUSIONS

6.1 Historical Summary

Prior to construction of the Sunnyvale East and West Channels during the late 1950s and 1960s, the land along the channel alignments was primarily agricultural (row crops and orchards). Currently, most properties adjacent to the West Channel are developed for commercial use. A mix of residential and commercial properties currently borders the East Channel.

6.2 Potential Soil, Sediment and Ground Water Quality Concerns

6.2.1 Levee Soil and Channel Sediment

The channels were constructed on land that was used for agricultural purposes for many decades. During the course of agricultural use, pesticides, such as DDT, likely were applied to crops in the normal course of farming operations. There is no indication of any uncontrolled release of pesticides; however, there is a potential that soil within the channel levees and channel sediment may contain residual pesticide concentrations from historical agricultural use. As discussed in Section 5.2, pesticides were identified in levee soil and channel sediment from similarly constructed channels including the Northern Channel and those associated with Pond A4, located near or adjacent to the northern portions of the Sunnyvale channels. Pesticides also were detected in sediment from the "on-site" Moffett Channel, which consists of the northern portion of the Sunnyvale West Channel.

Studies of these nearby channels (see Section 5.2) also detected other contaminants, including PCBs, metals and PAHs. Because these off-site channels are nearby or adjacent to the Sunnyvale Channels and are similar in construction and use (primarily used for storm water drainage), it appears reasonable to conclude that similar contaminants, at similar concentrations, may also be present in levee soil and sediment within the Sunnyvale channels. Some of the contaminants, such as pesticides, may be present along the entire length of the channels since the land along the channel alignments historically was primarily agricultural. The other potential contaminants including PCBs, metals, and PAHs, if present, would be expected to be at their highest concentrations near and down-stream of commercially developed areas that are more common within the northern portion of the study area. The detected contaminants most likely are from non-point sources associated with urban runoff, as well as past agricultural activities. Additionally, the Sunnyvale WWTP effluent is discharged into the Sunnyvale West Channel; this discharge also is a possible contaminant source (as discussed in Section 5.2.2).

6.2.2 Ground Water

As discussed in Section 5.2, several spill incidents were identified near the channel alignments that have impacted ground water, mainly with VOCs. Based on the information reviewed, it appears likely that ground water below most of the Sunnyvale West Channel is impacted with VOCs. VOCs additionally have been reported in ground water near the East Channel between about East Evelyn Avenue and Highway 101. The East Channel alignment also passes adjacent to several commercial facilities to the north of Highway 101; the data reviewed does not indicate that significant releases have occurred from these facilities, but the commercial nature of the area suggests that the potential for ground water impact exists.

7.0 RECOMMENDATIONS

7.1 Soil and Ground Water Sampling

We understand that future improvements for flood control purposes may include excavation, raising existing levees, building new levees or floodwalls, bridge and culvert replacement, and erosion protection measures.

At some locations, this work will presumably require disturbing levee soil and/or channel sediment; contact with impacted ground water or the need for dewatering could also occur. Because soil, sediment and/or ground water could contain contaminants, testing of these materials is recommended to better evaluate the extent of impact, if any, and to help establish appropriate methods for worker safety and material handling/disposal. The scope of such testing would be dependent upon the type and location of work to be performed.

For the purposes of evaluating potential worker health and safety concerns and soil management/disposal issues, testing of soil and sediment could be limited to proposed work locations where the planned work will involve worker contact with soil or sediment and/or locations where excess soil or sediment will be generated for disposal.

Testing of ground water is recommended at locations outlined in Section 6.2.2 (*i.e.*, at locations where impacted ground water is known or suspected to be present) if the planned work will involve the need for ground water extraction/disposal or if worker contact with ground water is anticipated. If extraction and disposal of impacted ground water are necessary during construction activities, we recommend that a management plan be developed to outline appropriate handling, treatment and/or disposal methods.

7.2 General Discussion and Potential Ecological Concerns

Although existing sampling data from the Sunnyvale channels is limited, the data reviewed from studies of the nearby Northern Channel and Pond A4 suggests that contaminant concentrations are likely to be relatively low when compared to hazardous waste criteria or human health screening levels. The reported concentrations, however, have commonly exceeded screening levels and/or established clean up goals developed for the protection of ecological receptors.

Thus, we would not expect construction worker health and safety issues to be a significant obstacle associated with the project. As noted above, on-site testing should be conducted, which will provide a greater degree of certainty. An appropriate health and safety plan should subsequently be developed and implemented.

Based on the available data, it appears likely that excavated soil or sediment could be disposed off-site as non-hazardous waste. If on-site reuse of these materials is contemplated, further evaluation of potential impacts to ecological receptors would be warranted.

7.0 LIMITATIONS

As with all site assessments, the extent of information obtained is a function of client demands, time limitations, and budgetary constraints. Our conclusions and recommendations regarding the site are based on readily observable site conditions, review of readily available documents, maps, aerial photographs, and data collected and/or reported by others. Due to poor or inadequate address information, the regulatory agency database report listed several sites that may be inaccurately mapped or could not be mapped; leaks or spills from these or other facilities, if nearby, could impact the site. As directed by you, we are relying on information presented in reports provided to us by you or your representative. We are not responsible for the accuracy of information or data presented by others.

Our conclusions and recommendations in this site assessment are qualified in that no soil, ground water, or air analyses were performed. Sampling and analysis lead to a more reliable assessment of environmental conditions, which often cannot be noted from the scope conducted during this study. Should you desire a greater degree of confidence, these samples should be obtained and analyzed to further evaluate environmental conditions.

This report was prepared for the sole use of the Santa Clara Valley Water District. We make no warranty, expressed or implied, except that our services have been performed in accordance with environmental principles generally accepted at this time and location.

8.0 REFERENCES

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP). March 2005. *Hydromodification Management Plan (HMP) report.*

Department of the Navy. June 24, 2005. *Final Record of Decision, Site 27 – Northern Channel. Former Navel Air Station Moffett Field, Santa Clara County, California.*

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Locus Technologies. January 30, 2006. *Annual Groundwater Monitoring Report, January to December 2005, The Companies Offsite Operable Unit, Sunnyvale, California.*

CRWQCB. July 2006. *Invitation to Comment on Proposed Remedial Action Plan for Cleanup of Soil at T-M Manufacturing and Lefco, Inc. Facilities 695 East Arques Avenue and 698 East Taylor Avenue Sunnyvale, Santa Clara County*

SECOR International. June 23, 2006. *Remedial Action Plan for Removal of Chlorinated Solvent Impacted Soil, Installation of Monitoring Well, and Ground water Monitoring Program, T-M Manufacturing Facility 695 East Arques Avenue Sunnyvale, Santa Clara County.*

Locus Technologies. January 30, 2006. *Annual Groundwater Monitoring Report, January to December 2005, 740 Kifer Road Site, Sunnyvale, California.*

Tetra Tech EM, Inc. February 26, 2004. *Technical Memorandum Investigation of the Moffett Channel, Former Naval Air Station, Moffett Field, Santa Clara County, California*

CH2MHILL. October 2005. *Hazardous Material Investigation Report, Pond A4 Tidal Wetlands Restoration Project.*

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TRC

405 Clyde Avenue
Mountain View, CA 94043

650.967.2365 PHONE
650.967.2785 FAX

www.TRCsolutions.com

June 13, 2007
109-21

Ms. Michelle Martin
SANTA CLARA VALLEY WATER DISTRICT
5750 Almaden Expressway
San Jose, California 95118-3614

**RE: ENVIRONMENTAL SITE ASSESSMENT
SUNNYVALE EAST AND
WEST CHANNELS
SUNNYVALE, CALIFORNIA**

Dear Ms. Martin:

As requested, we have performed an environmental site assessment of the Sunnyvale East and West Channels in Sunnyvale, California. This report was prepared in accordance with our agreement dated March 6, 2007.

We refer you to the text of the report for details regarding this study. Thank you for choosing us to assist you. If you have any questions, please call and we will be glad to discuss them with you.

Very truly yours,

TRC

Leonardo Alvarez, P.G., C.E.G.
Senior Principal Geologist
Director of Environmental Services

LA:SIF:cah

Copies: Addressee (2)

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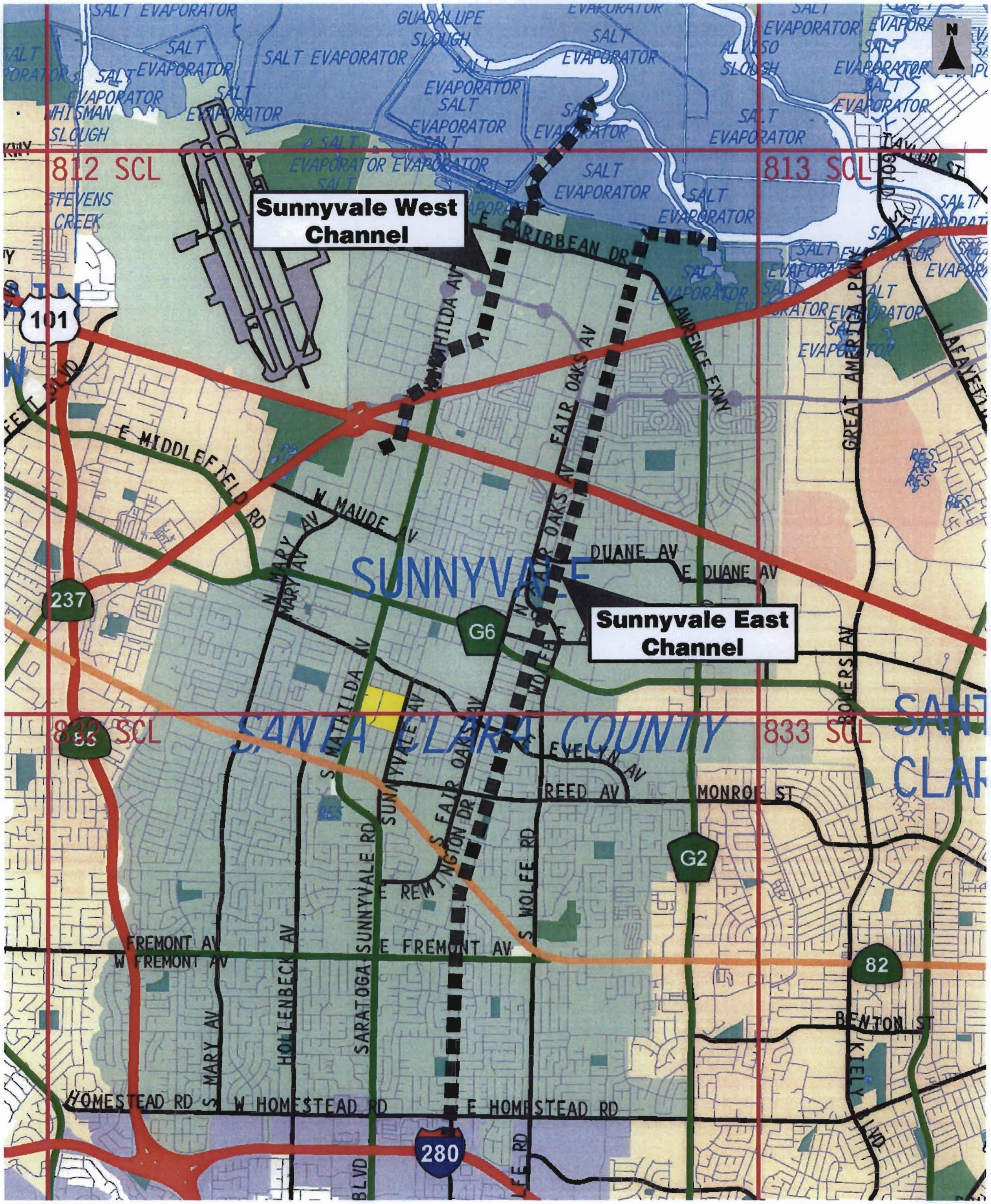

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VICINITY MAP

SUNNYVALE EAST AND WEST CHANNEL
Sunnyvale, California

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FIGURE 1
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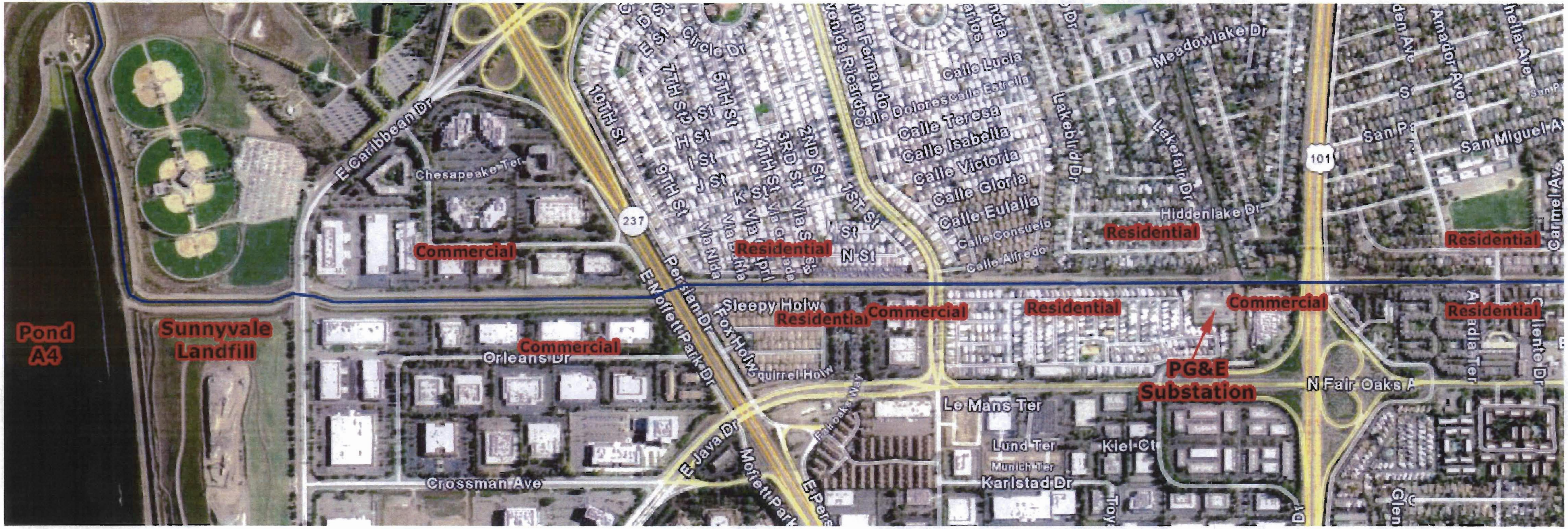

See Figure 2B

0 ~1,500 ft.

Base by Google Earth.

SITE PLAN - EAST
SUNNYVALE EAST CHANNEL
Sunnyvale, California

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FIGURE 2A

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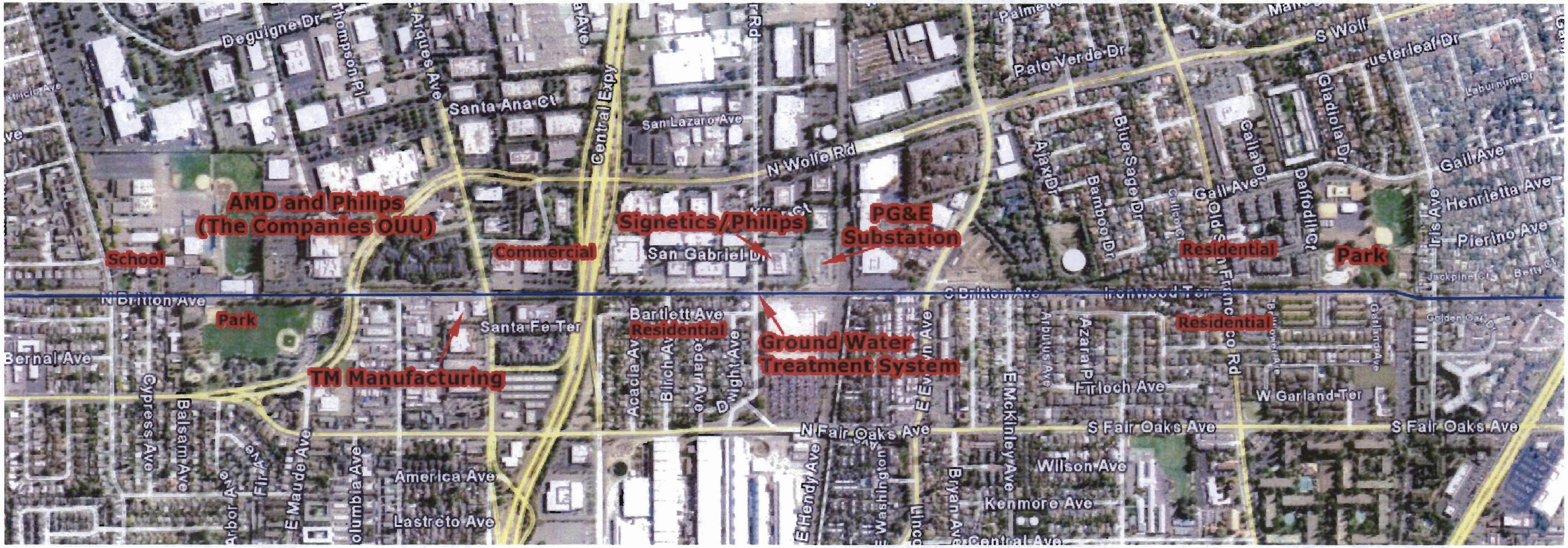
See Figure 2A



See Figure 2C

0 ~1,500 ft.

Base by Google Earth.

SITE PLAN - EAST
SUNNYVALE EAST CHANNEL
Sunnyvale, California

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FIGURE 2B

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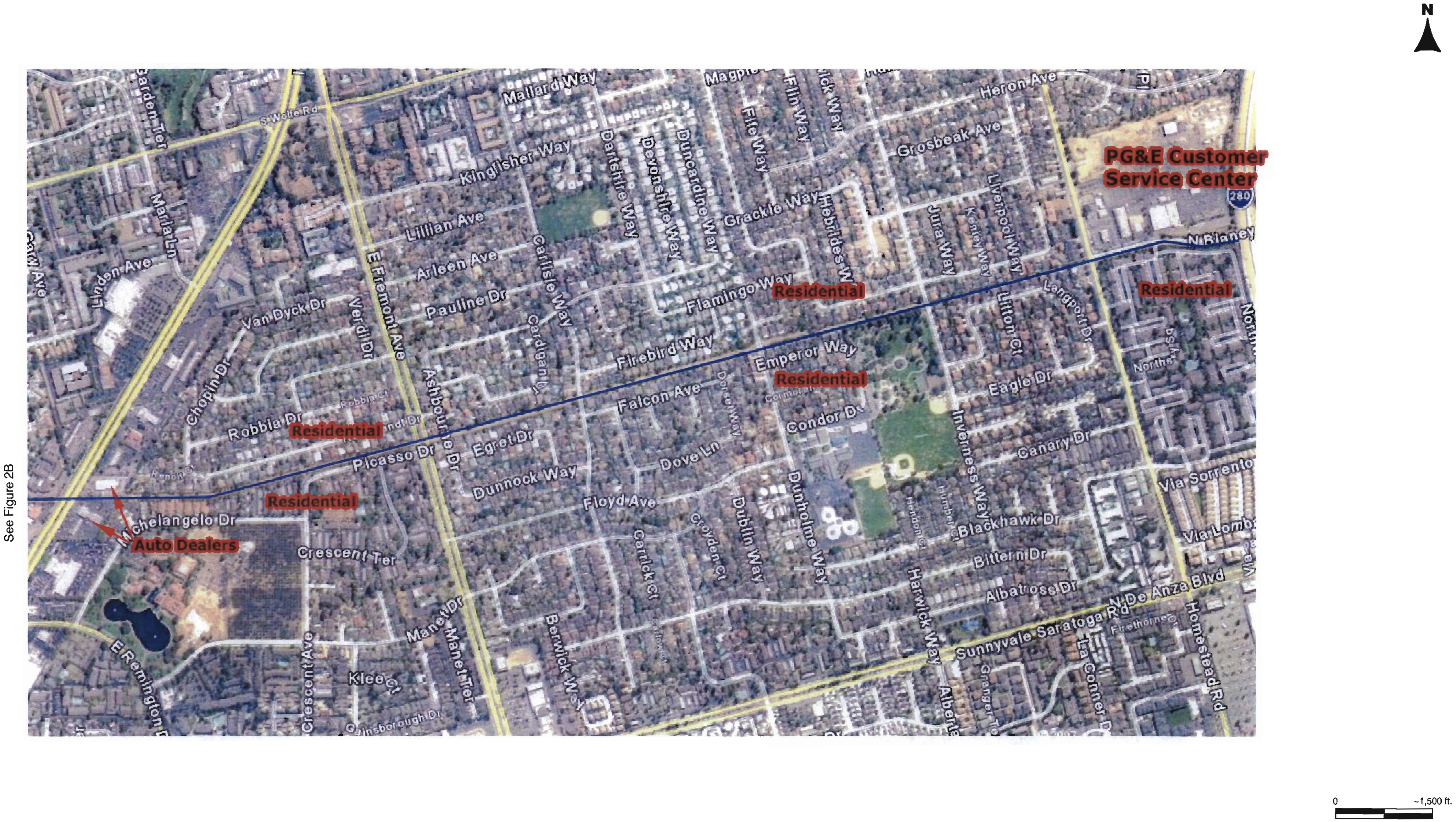

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SITE PLAN - EAST

SUNNYVALE EAST CHANNEL
Sunnyvale, California

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FIGURE 2C

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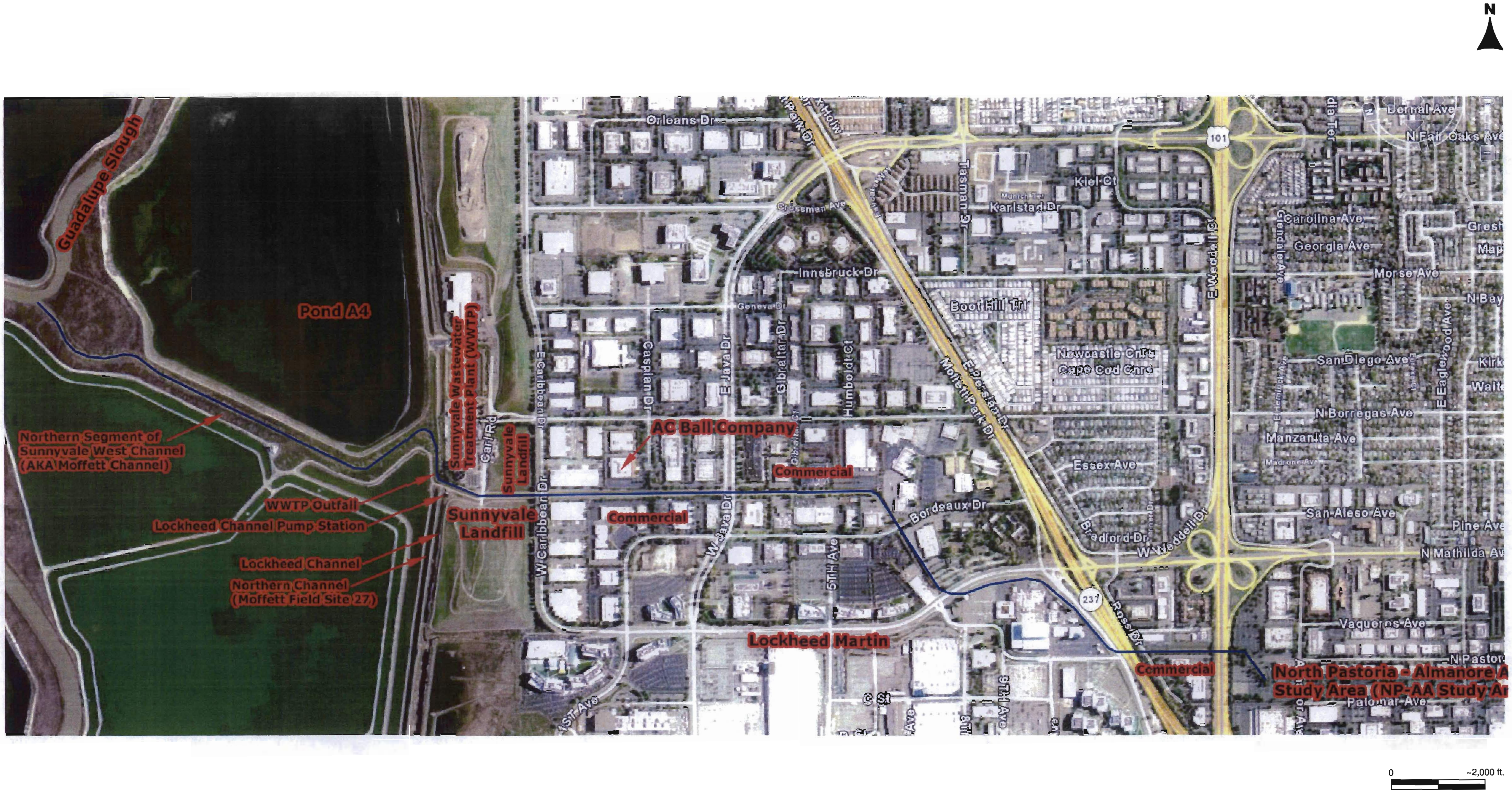
4/07*EB



SITE PLAN - WEST
SUNNYVALE WEST CHANNEL
Sunnyvale, California

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FIGURE 3

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Base by Google Earth.

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